Adequate experimental trial should precede the clinical use of any untested plastic material in surgery.

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CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

Weekly Clinicopathological Exercises

FOUNDED BY RICHARD C. CABOT

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CASE 33111

PRESENTATION OF CASE

A thirty-seven-year-old Swedish asbestos worker entered the hospital because of cough and chest pain.

Two and a half years before admission the patient had developed a cough, nasal congestion, nasal discharge, fever and shortness of breath that had persisted one week and had been followed by a dull, aching pleuritic pain along the left costal margin. He was hospitalized for a week and then rested at home for four months. In the hospital about 1000 cc. of fluid was removed from the left side of the chest. Subsequently, he returned to work and felt well except for a morning cough productive of small amounts of odorless white sputum. Occasional chest pain and exertional dyspnea were also noted. A year and a half later there was an insidious onset of weakness and fatigability and a gradual loss of 25 pounds in weight. Three months before entry the pleuritic pains became persistent, and the weakness and dyspnea severe, and the patient slept propped on two pillows. Repeated sputum smears were negative for tubercle bacilli.

The patient's work consisted in cutting asbestos insulating board; he denied exposure to undue amounts of dust. There was no history of exposure to tuberculosis.

Physical examination revealed the patient to be orthopneic and breathing rapidly at a rate of 30 per minute, with a dry, hacking cough and clubbed fingers. There was a slight, shotty, generalized lymphadenopathy. Respiratory expansion on the left was diminished, as were tactile and vocal fremitus and breath sounds. On the right there were increased bronchovesicular breath sounds and scattered dry rales. The heart and mediastinum were shifted to the right, and the apical beat was maximal in the right midclavicular line. There was a ticktack rhythm with a rate of 110, and a pulsus paradoxicus. The abdomen was normal.

The temperature was 100°F. The blood pressure was 128 systolic, 70 diastolic.

Examination of the blood disclosed a red-cell count of 4,900,000 and a white-cell count of 12,200, with 77 per cent neutrophils, 16 per cent lymphocytes and 7 per cent monocytes. The urine and stools were normal. X-ray examination showed numerous discrete areas of increased density scattered over the right lung; pressing on the lower trachea and left main bronchus and deviating them to the right was a large mass measuring 11 cm. in diameter (Fig. 1). A small amount of aerated lung was seen at the periphery of the mass. There was either fluid or, more probably, dense pleural thickening and collapsed lung between the mass and the lateral costal margin. The left lower-lung field was almost completely opaque.

In the hospital the patient's condition became steadily worse. Further x-ray studies showed displacement of the esophagus to the right (Fig. 2), extensive periosteal new bone formation of the left upper ribs, slight displacement of the stomach to

the left, enlargement of the spleen and the suggestion of a retroperitoneal mass rotating the left kidney. Three attempted thoracenteses failed to encounter fluid, although the needle was inserted to a depth of 5 cm. No acid-fast organisms were found in the sputum. Tuberculin tests were negative in a 1:1000 dilution. The patient became extremely weak and dyspneic and perspired constantly. He died on the thirty-seventh hospital day.

the final hospital admission, with fever for [illegible]. About 1000 cc. of fluid was removed, follow[illegible] which the patient was discharged from the hospi[illegible] He then rested at home for four months, retur[illegible] to work and remained in good condition for a ye[illegible] This could have been pleurisy with effusion, perha[illegible] tuberculous. Many sputum examinations, howeve[illegible]

FIGURE 1. *Roentgenogram of the Chest, Showing Opacity on the Left and Multiple Nodules in the Right Lung.*

DIFFERENTIAL DIAGNOSIS

DR. DONALD S. KING: This seems to be the old problem of a tumor in the lung with a decision to be made regarding the kind of tumor. As in most cases, the decision will be based largely on the x-ray appearance.

One should comment first on the occupation. This man worked with asbestos, cutting insulating board. Exposure to asbestos causes lung changes but never, in my experience, to the extent that was present in this case. I believe that asbestosis was not a factor in the illness and that, if present, it was of secondary importance.

The next question concerns tuberculosis. The onset of the disease was two and a half years before showed no tubercle bacilli, and shortly before death a tuberculin skin test was negative in a 1:1000 dilution. In any event, the evidence for tuberculosis does not seem sufficient to justify that diagnosis in addition to what I believe was a tumor. My diagnosis is tumor, with fluid that was secondary to the tumor and not due to tuberculosis or other infection.

The x-ray films present a different picture on each side of the chest. On the right side there are many nodules, which are better shown in some films than others. In my experience, rounded nodular shadows of this sort have always been caused by metastatic tumor, either from some spot elsewhere in the lung or from some place outside the chest. If the tumor was metastatic from outside the lung, it could have been from above the clavicles or below the diaphragm, or there could have been metastases from a primary bronchiogenic cancer in

left lung or from a mediastinal tumor. I should to ask Dr. Schatzki whether he has ever seen nded shadows of this size and density that were to tumor.

ICHARD SCHATZKI: Yes.

DR. KING: I stand corrected on that point.

DR. SCHATZKI: That does not mean that this not a tumor.

DR. KING: I have never seen rounded shadows of size and distribution with silicosis, tuberculosis air left in the left lung is the small amount seen in the left upper lung. The films do not show what is going on lower down.

DR. KING: So you will not help regarding the position of the tumor — that is, whether it is in the lung or outside the lung?

DR. SCHATZKI: I think that I could help if I was allowed to.

DR. KING: I think that it would be all right; how about it, Dr. Castleman?

FIGURE 2. *Roentgenogram of the Chest and Abdomen following a Barium Swallow, Showing Displacement of the Esophagus and Stomach by a Mass in the Left Side of the Chest.*

fact anything, and I therefore believe that ocess in the right lung was definitely a meta- tumor. The x-ray film of the left side of the shows a large, round mass displacing the a and the left main bronchus to the right. tumor in the lung itself or in the mediastinum?

SCHATZKI: The same mass is visible on this the same position. I do not believe that one try to delineate the exact outline of the so little air is present. Other criteria ed to demonstrate the mass. The only

DR. BENJAMIN CASTLEMAN: By all means.

DR. KING: I need a great deal of help.

DR. SCHATZKI: There is some definite evidence of a large mass outside the lung. The first indication is the position of the esophagus, which is displaced far to the right side by a mass. This mass has a diameter much larger than the mass in the upper-lung field, and therefore it cannot be a tumor in the lung. The second point is the position of the fundus of the stomach, which is pushed downward in contrast to what one would expect with a lung tumor

that has produced collapse. Thirdly, the ribs, if anything, are spaced farther apart than on the normal side, which is again unusual for a lung that has collapsed.

DR. KING: I should have committed myself before I asked that question, but I agree with your conclusions. I cannot be sure that this was not a bronchiogenic carcinoma of the left upper lobe, but my opinion is against that diagnosis. There was also involvement in the left lower lobe. I suppose that this also may have been a tumor. Do you want to commit yourself on that, Dr. Schatzki?

DR. SCHATZKI: I think that I know the answer. It is obvious, as I have said, that there was something outside the lung; otherwise, the stomach would not have been displaced or the ribs separated.

DR. KING: Do you think that it was a tumor or fluid?

DR. SCHATZKI: I believe that it was a tumor.

DR. KING: That is what I believe.

Let us go down to the abdomen. Was the spleen enlarged or was it displaced downward? I should like to omit the spleen if I may.

DR. SCHATZKI: So far as I am concerned, it may be excluded.

DR. KING: Was the stomach involved?

DR. SCHATZKI: There is no evidence of involvement of the stomach. It was displaced, but this was due to the low position of the left leaf of the diaphragm.

DR. KING: Was the liver enlarged? And was the displacement of the stomach to the left due to such enlargement?

DR. SCHATZKI: The liver was not enlarged so far as I can tell.

DR. KING: This is an intravenous pyelogram showing a retroperitoneal mass rotating the left kidney.

DR. SCHATZKI: Both kidneys are low in position, and I am wondering if what we see is not again due to the low position of the diaphragm.

DR. KING: You do not see the retroperitoneal mass?

DR. SCHATZKI: Not that I can be sure of. I do not see the outline of the kidneys so well as I should like to. The upper pole of the right kidney is clearly seen, but the upper pole of the left kidney is not.

DR. KING: I suppose that you have helped all you can. Do you want to say anything more?

DR. SCHATZKI: Yes; there are some rib changes.

DR. KING: You mean the periosteal changes in the rib? I have seen such changes only with pus. Have you seen periosteal changes with large tumor masses?

DR. SCHATZKI: We have seen them in patients who did not have empyema but who had a chronic nonspecific process in the lung.

DR. KING: The films show the periosteal changes clearly, and I am inclined to agree.

Actually, we have no evidence of any source of tumor outside the chest, but the possibility of tumors in the pharynx and the thyroid should be mentioned because findings similar to those in this case follow metastases from malignant tumors in those areas. We are not justified, however, in making such a diagnosis with the evidence at hand. Below the diaphragm there is no indication of disease of the stomach, pancreas, liver or kidneys. These films at first suggested that the testicle or the prostate was the primary source, or perhaps a so-called "hypernephroma." This is a fairly characteristic picture for metastases from the testicle or prostate, but we have no evidence to make that diagnosis. There does not seem to me to be any justifiable source for the tumor outside the chest, and we are back to the problem of what this tumor was.

Was it bronchiogenic or mediastinal? We have seen exactly this picture with teratomas of the mediastinum that have eventually broken loose. If it was a lung tumor I lean toward a bronchiogenic carcinoma with metastases to the right lung and possibly the retroperitoneal area. The findings were not quite consistent with those of bronchiogenic carcinoma because such tumors are usually not large enough to push the mediastinum to the other side unless a great deal of fluid is present. Also, the rib changes were more like those with a large tumor mass that had been pressing on that area for some time. The process had been going on for perhaps two and a half years. My diagnosis is a mediastinal tumor, probably a teratoma, with metastases to the right lung. I do not believe that the tumor was a lymphoma, although again that must always be considered. I doubt whether it was a bronchiogenic carcinoma with metastases.

DR. F. DENNETTE ADAMS: How do you exclude lymphoma?

DR. KING: I do not exclude it. I have not seen x-ray findings such as these with lymphoma, which usually causes more symptoms than this man had for two and a half years. The other conditions I have named seem likelier.

DR. ALFRED KRANES: Is it not unusual for fluid due to tumor to subside for so long a time?

DR. KING: Yes; that is one of the things against trying to explain the whole picture as tumor. I agree that subsidence of all symptoms for a year after the removal of 1000 cc. of fluid in a case of tumor is not usual. I wanted to make the diagnosis of tuberculosis, but I could not.

DR. CHARLES L. SHORT: I saw this patient on the ward, and I went through much the same line of reasoning as Dr. King has. From the history my impression was tuberculosis, but from the x-ray findings that certainly could not have been the primary diagnosis. I do not believe that most of us went so far as Dr. King in being willing to say that the tumor was primary in the chest. We thought of lymphoma and for that reason small

of x-ray therapy were given, without effect the lesion. We were able to get a needle biopsy orly before death. A mass developed above the clavicle about 5 cm. in diameter, and we thought at there was also a mass in the epigastrium.

DR. KING: Such metastases would be against my diagnosis. A primary carcinoma of the lung would be likelier to metastasize to the neck, although lymphoma could do so.

CLINICAL DIAGNOSIS

Carcinoma of lung, probably metastatic.

DR. KING'S DIAGNOSIS

Mediastinal teratoma, with metastases to right lung.

ANATOMICAL DIAGNOSIS

Mesothelioma of pleura and pericardium, with metastases to right lung and retroperitoneal lymph nodes.

PATHOLOGICAL DISCUSSION

DR. CASTLEMAN: The left lung was completely encased on all sides by a thick, hard, somewhat

FIGURE 3. *Photograph of Coronal Section of the Left Lung, Showing Complete Encasement by the Pleural Tumor.*

shiny, fibrous tumor compressing the lung into a small fraction of its normal volume. In places this thickening of the pleura or tumor tissue involving the pleura measured as much as 8 cm. (Fig. 3). There were multiple tumor nodules in the right lung, but no involvement of the pleura. This was in sharp contrast to the left lung, which was free from any parenchymatous tumor nodules. The heart and pericardium together weighed 1100 gm. The heart itself was perfectly normal, the increase in weight being due to the tremendous thickening of the visceral pericardium, which measured as

FIGURE 4. *Photograph of the Heart, Showing Neoplastic Involvement of the Visceral Pericardium.*

much as 3 or 4 cm. in thickness (Fig. 4). This gross picture of involvement of the pericardium and

FIGURE 5. *Photomicrograph of the Mesothelioma.*

pleura fits in with the diagnosis of mesothelioma. We examined the bronchi carefully throughout the left lung and found no evidence of tumor within a

bronchus, near a bronchus or in the lung itself. The nodules in the right lung were well circumscribed in the parenchyma away from the bronchi and were definitely metastatic. We were quite certain that we could rule out bronchiogenic or primary carcinoma of the lung. The bronchial lymph nodes contained no tumor. We searched every organ for a primary source, but we were unable to find any.

The histology of the tumor was typical of what has been described as a mesothelioma (Fig. 5). The cells in some areas were cuboidal and arranged around fibrous stalks giving a pseudopapillary pattern. In other areas the cells were large, irregular and closely packed. Some were multinucleated, and others seemed to be forming mucinous material.

A number of papers have been written to the effect that there is no such tumor as mesothelioma of the pleura, that the cells lining the pleura do not form tumors and that these tumors really arise from a small focus in the lung. We have held a similar opinion for a long time. This is perhaps the first case in which we believed that there was actually such a tumor. It certainly fits in with most of the cases of mesothelioma of the pleura that have been reported.*

DR. KING: I do not consider that it is fair to have given me a case with a diagnosis against which you, as pathologists, have been talking for twenty years. I could never make Dr. Mallory accept a diagnosis of mesothelioma of the pleura.

DR. CASTLEMAN: He has been sold on this one. The lesion in the abdomen was retroperitoneal tumor, but there was no tumor elsewhere.

DR. ADAMS: What was the large lesion in the left lung?

DR. CASTLEMAN: It was merely nodularity due to the pleural tumor.

*Klemperer, P., and Rabin, C. B. Primary neoplasms of pleura. *Arch. Path.* 11:385-412, 1931.

CASE 33112

PRESENTATION OF CASE

A seventy-two-year-old Polish housewife entered the hospital in coma.

Eleven days before entry the patient had received a slight back injury in an automobile accident. A physician examined her at that time and found only slight spasm along the lumbar muscles. Three days later the physician was called again because the patient complained of slight bleeding supposedly from the vagina; he could find no evidence of bleeding. Six days before entry the patient began to have frequent episodes of abdominal cramps. These continued daily. Three days later the abdomen was distended, with marked tenderness and a mass in the right lower quadrant. The patient was taken to another hospital, where a plain film of the abdomen and a barium enema showed an abrupt, shelf-like obstruction in the lower sigmoid, with a markedly dilated large bowel, particularly on the right, and beginning small bowel dilatation. Routine urine examinations were said to have been negative. There was a slight leukocytosis, and the blood sugar was 196 mg. per 100 cc. On the following day the patient appeared acutely ill. The abdomen was greatly distended, and the patient complained of abdominal pain. No organs or masses could be felt. The pulse was about 115. On the same day an emergency cecostomy was performed under a local anesthetic. There was an increased amount of clear, straw-colored fluid in the peritoneal cavity. The colon and cecum were greatly distended, and a large amount of fluid and gas was removed by trocar suction. A glass Mixter tube was fixed in place by sutures. Following the operation the patient was said to have improved for a while, but the abdominal symptoms subsequently reappeared. She was transferred to this hospital on the afternoon of the second postoperative day.

The patient was known to have hypertension. A sister had diabetes.

Physical examination revealed an obese, disoriented woman. The left border of the heart extended beyond the midclavicular line, but the heart sounds were normal. There were coarse rhonchi, which cleared on coughing, in both lower lobes. The abdomen was distended, tense and slightly tender. Peristalsis was limited to a few tinkles. The diaphragm was high on both sides but moved to percussion. The cecostomy appeared to be functioning well.

The temperature was 100°F., the pulse 120, and the respirations 30. The blood pressure was 110 systolic, 70 diastolic.

A Levine tube was passed immediately on entry, and 500 cc. of brownish fluid, as well as considerable gas, was aspirated from the stomach. The patient also received 600 cc. of 5 per cent dextrose in water and oxygen. During the night she became extremely disturbed, tore up the oxygen tent and pulled out the intravenous drip and stomach tubes. The cecostomy drained 1680 cc. of fluid, and 646 cc. of urine was passed on the first hospital day. On the morning of the second hospital day the distention appeared to be slightly less, and peristaltic tinkles were somewhat more frequent. The tongue was dry.

The temperature was 102°F., the pulse 130, and the respirations 30. The blood pressure was 100 systolic, 60 diastolic.

Examination of the blood showed a hemoglobin of 16.3 gm. per 100 cc., a hematocrit of 50 and a white-cell count of 9700, with 85 per cent neutrophils. The total protein was 8.5 gm. and the nonprotein nitrogen 100 mg. per 100 cc.; the carbon

dioxide content was 30.1 and the chloride 91 milliequiv. per liter. The prothrombin time was 18 seconds (normal, 14 seconds).

The urine was acid, had a specific gravity of 1.026 and gave a ++ test for albumin. It did not contain sugar or diacetic acid. The sediment showed many hyaline and some granular casts, as well as 6 white cells per high-power field. X-ray films of the chest and stomach showed the diaphragm to be high in position, and there were segmented areas of atelectasis in the left lower lobe. The stomach was greatly distended by gas. The small intestine contained a moderate amount of gas but was only slightly dilated. The colon was not distended, but the right side contained a large amount of fecal material.

During the day the patient gradually became drowsy. She was given 1500 cc. of 5 per cent dextrose in physiologic saline solution and 900 cc. of 5 per cent dextrose in water, and administration of 100,000 units of penicillin every three hours was begun. In the afternoon the chloride had fallen to 74 milliequiv. per liter. The patient was cold and clammy and appeared sicker, although the abdomen was softer and peristalsis was improved. The blood pressure was 160 systolic, 90 diastolic, and the pulse was strong. The cecostomy drainage was 475 cc. The urine output had fallen off, although the actual amount was not recorded.

On the third hospital day the patient seemed somewhat more alert. The abdomen was much softer, and peristalsis was fairly good. The heart sounds, however, were distant, with a ticktack rhythm. The hematocrit was 57. The protein was 8.5 gm., the nonprotein nitrogen 155 mg. and the blood sugar 200 mg. per 100 cc.; the chloride was 85 and the carbon dioxide 30.8 milliequiv. per liter. The patient was given 3000 cc. of 5 per cent dextrose in saline solution and started on 8 units of insulin. The cecostomy drainage was 230 cc.

On the fourth hospital day the temperature rose to 105°F., and the patient became incoherent and restless, with muscle twitching. The hematocrit was 56. The chloride was 92 and the potassium 2.5 milliequiv. per liter, the nonprotein nitrogen 150, the calcium 7.7 and the blood sugar 308 mg. per 100 cc. An electrocardiogram showed a sinoauricular tachycardia at a rate of 125. There were low T waves and moderate left-axis deviation. The chest leads showed a low T wave in Lead CF4. The patient was given 20 cc. of calcium levulinate without any effect on the muscle twitching. She also received 500 cc. of 5 per cent dextrose in physiologic saline solution, 500 cc. of whole blood and 2500 cc. of 5 per cent glucose in half-strength physiologic saline solution. Nevertheless, she gradually relapsed into coma, and by evening the temperature had reached 106°F. She died on the fifth hospital day.

Differential Diagnosis

Dr. William W. Beckman: This case is a new experience for me because yesterday Dr. Castleman sent the clinical record of this patient to my office and said that I could read it. The record provided really only one datum that is not in the protocol. One gathered from a reading of the record — although it did not state definitely — that a Levine tube had been present in the stomach most of the time that the patient was in the hospital. There was constant drainage from the tube, although the amount is not stated.

Dr. John B. McKittrick: That is true.

Dr. Beckman: The point about this case that struck me when I first read the record was that the patient apparently had no abdominal pain until six days before entry. Five days before its onset she was examined by a physician who knew her language, — she did not speak English, — and there were no abdominal complaints. She had had a rather abrupt onset of abdominal cramps and apparently went rather rapidly into collapse. X-ray studies revealed obstruction of the sigmoid, which either had become acutely obstructed or, it seems even more probable to me, had perforated and caused peritonitis. I believe that, instead of actual obstruction from a carcinoma, paralytic ileus was present. In any event it is clear that the patient had a carcinoma. There is no question that cecostomy was the indicated step.

The patient was admitted in coma and was known to have an elevated blood sugar, which brings up the possibility of diabetes. Another thing I learned from the record was that there was practically no acetone in the urine. This fact and the carbon dioxide measurements are against diabetic acidosis as an explanation for the coma; indeed, the possibility of diabetic acidosis can scarcely be entertained. The patient probably had the type of acidosis associated with arteriosclerosis in old people, which does not, so far as I know, produce coma. She had diabetes. One cannot be certain, however, how severe the diabetes was because in the hospital she was given injections of glucose that may have contributed to the elevation of the blood sugar.

The significance of the urinary findings is difficult to evaluate. The urine was said to have been normal when the patient was in the outside hospital. She had only one specimen here, which showed casts and albumin and which probably represented a certain amount of kidney disease, probably so-called "vascular nephritis." How much this contributed to the elevated nonprotein nitrogen is difficult to evaluate, because extrarenal factors must be considered.

Another point that was not mentioned in the protocol or the record is that the patient apparently had a fairly adequate urinary output during most of the hospital stay. In spite of this there was

evidence of marked depletion of the extracellular fluids, on the basis of the marked hemoconcentration shown by the elevated total protein, hemoglobin and hematocrit. There was a low chloride, a low calcium and a low potassium. For some reason there is no mention of the sodium. There was an elevated carbon dioxide content. All these things together indicate that the patient had lost a great deal of fluid from the upper gastrointestinal tract rather than from the cecostomy and that she had an alkalosis as a result of the removal of hydrochloric acid from the stomach.

I suppose that I was given this case to discuss the therapy, but I have always believed that this kind of exercise, in which the case terminates at autopsy, is not a satisfactory way of evaluating therapy. If we were to base an evaluation on such cases we should have to conclude that penicillin was of no value, and that is not quite true. The patient was desperately ill when first seen at the other hospital, and I give credit to everyone for the restrained but expeditious way in which the illness was managed. Every effort was made to correct the various surgical, bacteriologic and chemical abnormalities that were present. A cecostomy was performed to relieve acute large-bowel obstruction. Penicillin was given for what I think was peritonitis. The patient was given sufficient replacement fluid, but with restraint. Another point in the clinical record is that she was seen by Dr. Allan M. Butler, who thought the low potassium represented serious difficulty and suggested the intravenous administration of potassium. There is no way of knowing from the record whether potassium was given.

DR. MCKITTRICK: Potassium was not given.

DR. BECKMAN: It is difficult to administer a significant amount of potassium by vein, for high serum concentrations affect the myocardium and produce ventricular fibrillation. Perhaps with the low value it would have been proper to give a small amount, but potassium must always be given in concentrations not exceeding 4 to 6 milliequiv. per liter — the normal value for serum.

DR. MCKITTRICK: I should like to say that Dr. Beckman is a good detective because he deduced all the omissions from the record with exact accuracy. The Levine tube was taken out forty-eight hours before death. His deduction regarding the electrolyte loss is correct, in that for practical purposes all the loss was from the Levine tube. The short history, so far as anyone could determine, is correct. The patient had symptoms for only six days prior to death; they consisted chiefly of abdominal cramps, which began suddenly.

The question of coma on entry is interesting. I did not believe that the patient was in coma. She was moderately irrational, although she did answer questions in her own language. If she was in coma I do not know what kind, but it certainly was diabetic coma.

The only blood sugar determinations that indicated a disturbance in glucose metabolism were the ones taken before entry and the one taken at the hospital before intravenous therapy was given. The urinary output was fairly good throughout the hospital stay, with the exception of the last twelve to fourteen hours, when it was markedly diminished — in fact, practically nonexistent. The sodium determination was not done purposely; Dr. Butler, who was called in to see this patient, did not believe that it would help a great deal in planning the treatment. An electrocardiogram was taken in an effort to determine whether there was any evidence of a low potassium, but we could not get any assurance on that score. The report on the determination of potassium came back twenty-four hours later. Despite the low value, Dr. Butler, who was handling that aspect of the therapy, was not quite ready to give intravenous potassium.

My point of view in the treatment of this patient was one of timidity. She was seventy-two years old and had hypertension; she was admitted with a low blood pressure and was probably a senile diabetic patient, as Dr. Beckman has deduced. There was tenderness only over the sigmoid — a point that is not mentioned in either the record or the protocol. At one time we believed that we had induced a certain amount of pulmonary edema with the intravenous therapy. We were cautious about giving potassium, but it may have been needed. All along the line we trailed the patient physiologically; we never did catch up with her. On the night of admission I hesitated to give saline infusion. Whether she should have had saline or something else, I did not know. Peritonitis appeared to be present — I could not understand the small-bowel dilatation, the tremendous dilatation of the stomach or the ileus on any other basis. This was an extremely perplexing problem throughout. All of us see cases like this once in a while, and do not know how to handle them. This is a good case in point because obviously we did not handle the problem correctly. I think that the autopsy findings will either help in the deduction of what should have been done or add further confusion.

DR. VINCENT P. DOLE: The single reported urine specific gravity of 1.026 suggests that the renal function was adequate and that the limitation in renal performance was due to extrarenal circulatory disturbances. It is conceivable that with this infection there was subsequent intrinsic renal impairment. Toward the end the apparently adequate renal output may have been misleading if the kidneys had lost their capacity to concentrate.

DR. MCKITTRICK: Several urine analyses were made at the other hospital. Incidentally, I was the surgeon who did the cecostomy. There was an adequate specific gravity. Unfortunately, only one

determination was made here, but I think that it was everyone's impression who followed this patient that the renal function was reasonably good until terminally, when the urinary output suddenly dropped and the patient excreted practically no urine.

Clinical Diagnoses

Carcinoma of sigmoid, with perforation.
General peritonitis.

Dr. Beckman's Diagnoses

Carcinoma of sigmoid.
Intestinal obstruction (? paralytic ileus or mechanical).
Peritonitis.
Mild vascular nephritis.
Diabetes mellitus.
Severe dehydration.
Alkalosis.

Anatomical Diagnoses

Colloid carcinoma of sigmoid, with perforation and localized peritonitis.
(Electrolytic imbalance, with renal insufficiency.)

Pathological Discussion

Dr. Tracy B. Mallory: Autopsy showed some of the obvious things that were predicted. There was a carcinoma of the sigmoid, and there was also extensive diverticulosis of the same area. The large bowel was full of feces despite the cecostomy. The peritoneal cavity showed fresh, rather loose adhesions that were probably due to the cecostomy operation a few days earlier. There was no generalized peritonitis. The carcinoma and the area of bowel immediately around it were necrotic and pulled apart in the prosector's hands as he was dissecting it. Although there was a localized sepsis, there was no general peritonitis.

I think that the major question of interest concerns the kidneys in that there seemed to be so much functional evidence of renal insufficiency — they showed practically nothing. The proximal convoluted tubules were swollen, and occasional loops of tubules revealed albuminous degeneration. It was the extremely mild nephrosis that Fahr* would have described as Grade I nephrosis when he wrote his monograph. I gather from the autopsy findings that the nitrogen retention and other changes were, as Dr. Dole suggested, prerenal rather than renal. I do not believe that the renal lesions can even remotely explain the functional findings.

Dr. Beckman: I should like to emphasize again that I still believe that the fluid administration was carried out with the proper restraint. I do not believe that one can stress the point too strongly that in a person with high blood pressure and hypertensive heart disease the administration of intravenous fluid and transfusions are apt to cause pulmonary edema. This is due to the development of acute left ventricular failure, with resultant congestion of the lungs.

Dr. Leonard P. Eliel: What do you think about the administration of 1.8 per cent of physiologic saline solution in a case of this sort to make up the salt deficit and not give too much fluid?

Dr. Beckman: I suppose that that would be wiser. I have not had any experience with such therapy.

Dr. McKittrick: I had a rather uncomfortable experience in a similar problem with a chemical imbalance, but in this case there was small-bowel obstruction. The patient was a seventy-five-year-old woman. We gave 1.8 per cent sodium chloride solution, because she had a low chloride, and she went into severe pulmonary edema, which complicated therapy from that point on. Incidentally she also traveled the same path as the patient in the case under discussion. One must be careful about using concentrated saline solution in older people despite the chemical levels.

*Volhard, F., and Fahr, T. *Die Brightsche Nierenkrankheit.* 702 pp. Berlin: Julius Springer, 1914. P. 7.